

Component Performance Studies

Summary

The component studies look at four specific components: motor-driven pumps, turbine driven pumps, motor-operated valves, and air operated valves. These components are in several systems each (see [Table 1](#)). The systems were selected based on risk importance (RI). This report updates *NUREG-1715, Volume 1 through 4*. [Table 2](#) shows a summary of the failure probabilities for the components studies over the entire industry.

Table 1. Component studies component and system cross-reference.

Plant Type	RI System	MDP	TDP	MOV	AOV
PWR	AFW	■	■	■	■
	CCW	■			
	CSS	■		■	
	CVC	■		■	■
	HPI	■		■	■
	ESW	■			
	RCS			■	
	RHR	■		■	■
BWR	ESW	■			
	HCI		■	■	■
	HCS	■		■	
	LCS	■		■	■
	RBC	■			
	RCI		■	■	■
	RHR	■		■	■

Table 2. Component performance data from 1987-2002.

Component	Estimated Number of Demands	Failure Mode	Number of Failures	Failure Probability		
				Lower Bound	MLE	Upper Bound
Air-operated valve	49924	Failure on demand	72	1.18E-03	1.44E-03	1.74E-03
	49924	Failure to close	28	4.07E-04	5.61E-04	7.57E-04
	49924	Failure to open	28	4.07E-04	5.61E-04	7.57E-04
Motor-operated valve	243336	Failure on demand	394	1.49E-03	1.62E-03	1.76E-03
	243336	Failure to close	126	4.46E-04	5.18E-04	5.98E-04
	243336	Failure to open	188	6.84E-04	7.73E-04	8.70E-04
Motor-driven Pump	190306	Failure on demand	280	1.33E-03	1.47E-03	1.62E-03
	190306	Failure to start	240	1.13E-03	1.26E-03	1.40E-03
Turbine-driven pump	18776	Failure on demand	231	1.10E-02	1.23E-02	1.37E-02
	18776	Failure to start	165	7.72E-03	8.79E-03	9.96E-03